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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,838	02/13/2002	Arunaya Majumdar	9840-066-999	2839

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EXAMINER

CHEU, CHANGHWA J

ART UNIT PAPER NUMBER

1641

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,838	MAJUMDAR ET AL.	
	Examiner	Art Unit	
	Jacob Cheu	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-7, 12-14, 16-18, 22, 24, 25-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-7, 12-14, 16-18, 22 and 24-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1641

DETAILED ACTION

Applicant's amendment filed on 10/27/2004 has been received and entered into record and considered.

The following information provided in the amendment affects the instant application:

1. Claims 2, 8-11, 15, 19-21, 23 are cancelled.
2. Claims 36 is added to the instant application.
3. Currently, claims 1, 3-7, 12-14, 16-18, 22, 24, 25-36 are under examination.

Claim Rejections - 35 USC § 112

Enablement

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 3-7, 12-14, 16-18, 22, 24, 25-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As set forth in *In re Wands*, 858 F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988), enablement requires that the specification teach those skilled in the art to make and use the invention without undue experimentation. Factors to be considered in determining, whether a disclosure would require undue experimentation include 1) the nature of the invention, 2) the state of the prior art, 3) the predictability or lack thereof in the art, 4) the amount of direction or guidance present, 5) the presence or absence of working examples, 6) the quantity of experimentation necessary, 7) the relative skill of those in the art, and 8) the breadth of the claims.

The instant invention directs to an apparatus and method to measure micro-forces due to interactions between a predetermined substance and a sensing material that binds to the substance. The method is carried out by the apparatus where a cantilever palette comprising an array of cantilever blocks containing cantilever fingers surrounding by finger frames forming a diffraction grating, where the cantilever finger comprising a sensing material specific for the predetermined substance, wherein binding occurs between the substance and the sensing material would result in a change in diffraction pattern or color of the diffracted light. The change of the diffraction pattern or color would provide a visual indication of the presence of the substance, and wherein the apparatus does not require an external source of electrical power for the cantilever palette.

In light of the specification, applicant does not provide any working example or experimental data with respect to the feasibility of the recited apparatus or method. Applicant merely states that the 5mm x 5mm in size of the cantilever block are “visible to the naked eye and are sufficiently large for loading a substance that is to be sensed” (See page 5, last paragraph to page 6, first paragraph). Additionally, applicant states that “[o]bserve that the cantilever 20 does not require external power, since the actuation is chemical and mechanical (chemical-mechanical) and the detection is based on dispersion of background white light” (See page 7, last paragraph). It nevertheless raises question of enablement.

First, applicant recites that the current invention does not require any external source of electrical power for the cantilever palette. Applicant states that the binding between the sensing material on the cantilever and the predetermined substance would cause diffraction pattern or color change, and such change can be “visualized” without use of any external detection power means, such as magnetic or electrical power. However, it is well-documented in the related field that cantilever is always connected with an external source of power, i.e. magnetic, electrical or thermo heat, to detect the variation of its vibration/or bending in response to the change of the circumstances, e.g. binding to the analytes (See US 5908981 (Altar et al), 5807758 (Lee et al.); 6096559 (Thundat et al.); 2004/0007051 (Bashir et al.)). For example, Altar et al.

Art Unit: 1641

teach using atomic force microscopy, or piezoresistor measurement to measure the change of the vibration on the cantilever in response to the binding on the analytes (Col. 1, line 57-60; Col. 3, line 12-18), Lee et al. teach using electrical or magnetic field to measure the cantilever bending (Col. 3, line 25-30; Figure 8), Thundat et al. teach using electrical field in a transducer to measure cantilever vibration (Col. 4, line 1-15; Figure 1), Bashir et al. also use atomic force microscopy and piezoresistor (Section 0006 and 0007). There is a need to supply a constant power to the cantilever to measure the difference of the binding between the analytes in interest and the cantilever. The power source is an inevitable feature for detection of the bending of a cantilever.

Second, applicant claims that the change of the diffraction based on the binding between the sensing material on the cantilever and the predetermined substance in the sample can be “visualized” without an external source of power. The example of the size of the cantilever block is shown in page 5, line 30-32, where 5mm x 5mm size of cantilever block is used. Applicant states that this “individual array block 22 are visible to the *naked eye*” (See page 5, last paragraph)(emphasis added). It raises questions concerning how sensitive is this cantilever block as to enable a person to visualize the difference of the diffraction with his or her naked eye without any aid of external source of power, such as AFM (atomic force microscopy) or piezoresistor or magnetic field. It is questionable whether any ordinary people, not necessary an artisan in the art, would be able to use his or her “naked eye” to discern the difference of the light diffraction and relate to the “*micro-forces* due to the interaction between a predetermined substance and a sensing material that binds the substance” as recited in the claim language (See claim 1)(emphasis added). Given the fact that most of the cantilevers, whether prior or current arts as mentioned above, would need an external power source to detect a marginal/or subtle bending in response to the micro-forces interaction on the cantilever, the current invention inevitably imposes an undue experimentation to a reasonable expectation of success for one ordinary skill in the art as to its feasibility and predictability in the art and how to effectively practice the recited apparatus and method, absent of a detailed instructions, working example and concrete data.

Art Unit: 1641

3. Applicant's arguments with respect to claims 1, 3, 5-7, 12-14, 16-18, 22-23, 25-27, 29-35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Cheu whose telephone number is 571-282-0814. The examiner can normally be reached on 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jacob Cheu
Examiner
Art Unit 1641



January 6, 2005



LONG V. LE
SUPERVISORY PATENT EXAMINER
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01/07/05